

AMENDMENT UNDER 37 C.F.R. § 1.111
U.S. Appln. No. 10/629,650
Atty. Docket No. Q76784

AMENDMENTS TO THE CLAIMS

This listing of claims will replace all prior versions and listings of claims in the application:

LISTING OF CLAIMS:

1. (currently amended): A LCD device comprising:
 - a first substrate on which pixels are arranged;
 - a second substrate coupled to the first substrate with a sealing member in such a way as to form a gap between the first and second substrates;
 - a liquid-crystal layer formed in the gap, the liquid crystal layer being confined by the sealing member; and
 - spacers arranged in the liquid-crystal layer;
 - wherein the first substrate has a display region for displaying images, the display region being defined to include the pixels;
 - wherein the first substrate has a non-display region formed outside the display region, the non-display region being located between the display region and the sealing member;
 - wherein the spacers are located in a first part of the liquid-crystal layer corresponding to the display region while none of the spacers are located in a second part of the liquid-crystal layer corresponding to the non-display region; and
 - further comprising a depression formed on an inner surface of the first or second substrate;

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wherein the depression is located in the second part of the liquid-crystal layer, and the depression constitutes a buffer space ~~for receiving which receives~~ extra liquid crystal ~~from the liquid crystal layer.~~

2-4. (canceled).

5. (previously presented): The device according to claim 1, wherein TFTs are arranged on the first substrate in such a way as to be electrically connected to the respective pixels, and a dielectric layer is formed on the first substrate to cover the TFTs and the pixels; and wherein the depression is formed in the dielectric layer.

6. (previously presented): The device according to claim 1, wherein a dielectric layer is formed on the second substrate; and wherein the depression is formed in the dielectric layer.

7. (previously presented): The device according to claim 1, wherein one of the first and second substrates comprises a transparent plate and the depression is formed on an inner surface of the plate.

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8. (previously presented): The device according to claim 1, wherein when the non-display region has a width L (μm) and the gap in the display region has an average value d (μm), the depression has a height H satisfying a relationship of

$$H \geq (1/2) \times (1000 + L) \times [0.02d + [L \times (0.02d/1000)]]/L \text{ } (\mu\text{m}).$$

9. (previously presented): The device according to claim 1, wherein the spacers are pole-shaped and formed on one of the first and second substrates.

10. (previously presented): The device according to claim 1 wherein the depression forms a step between the display region and the non-display region.

11. (withdrawn): A method of forming an LCD device comprising:
providing a first substrate on which pixels are arranged;
providing a second substrate;
wherein the first substrate has a display region for displaying images, which is defined to include the pixels, and a non-display region formed outside the display region;
and wherein the second substrate includes a region to be coupled to the first substrate corresponding to the display region and a region to be coupled to the first substrate corresponding to the non-display region;

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providing spacers on an inner surface of at least one of said first and second substrates in an area corresponding to the display region;

providing a sealing member on at least one of said first and second substrates in an area corresponding to the non-display region;

placing the first substrate and the second substrate together so that the inner surfaces of said first and second substrate face each other and contact said sealing member;

compressively deforming the sealing member to approximately the same height as said spacers;

injecting liquid crystal into a gap between the inner surface of said first substrate and the inner surface of said second substrate.

12. (withdrawn): The method of claim 11 wherein the sealing member is compressively deformed by applying a pressing force uniformly over the whole of the first and second substrates.

13. (withdrawn): The method of claim 11 wherein the sealing member is compressively deformed by applying a pressing force using a pair of surface plates.

14. (withdrawn): The method of claim 11 wherein gas in the gap between the first substrate member and the second substrate member is removed to create a pressure difference

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between the gap and the atmosphere outside the gap and the pressure difference causes the sealing member to be compressively deformed.

15. (withdrawn): The method of claim 11 further comprising applying a pressing force to the first and second substrates after the liquid crystal has been injected into the gap, whereby excess liquid crystal is removed from the gap.

16. (withdrawn): The method of claim 11 further comprising forming a depression on an inner surface of at least one of the first and second substrates in an area corresponding to the non-display region.

17. (withdrawn): The method of claim 11 further comprising providing an in-seal spacer in said sealing member.

18. (withdrawn): A method of forming an LCD device comprising:
providing a first substrate on which pixels are arranged;
providing a second substrate;
wherein the first substrate has a display region, for displaying images, which is defined to include the pixels and a non-display region formed outside the display region;

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and wherein the second substrate includes a region to be coupled to the first substrate corresponding to the display region and a region to be coupled to the first substrate corresponding to the non-display region;

providing spacers on an inner surface of at least one of said first and second substrates in an area corresponding to the display region;

providing no spacers on the inner surfaces of the first and second substrates in an area corresponding to the non-display region;

providing a sealing member on at least one of said first and second substrates in an area corresponding to the non-display region;

depositing liquid crystal on the inner surface of one of said first and second substrates;

bringing the first substrate and the second substrate together in a substantially vacuous atmosphere so that inner surfaces of said first and second substrate face each other and contact said sealing member;

removing said first and second substrates from the substantially vacuous atmosphere so that they are subjected to a pressing force by an atmospheric pressure wherein said sealing member is compressed to approximately the same height as the spacers.

19. (withdrawn): The method of claim 18 further comprising forming a depression on an inner surface of at least one of the first and second substrates corresponding to the non-display region.

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20. (withdrawn): The method of claim 18 further comprising providing an in-seal spacer in said sealing member.

21. (previously presented): The device according to claim 1, further comprising a dielectric overcoat layer on at least a portion of the second substrate;

wherein at least a portion of the dielectric overcoat layer in the second part of the liquid-crystal layer is selectively etched to remove portions of the dielectric overcoat layer and form the depression.

22. (currently amended): An LCD device comprising:

a first substrate;

pixels disposed on the first substrate;

a second substrate coupled to the first substrate;

a sealing member creating a gap between the first substrate and the second substrate;

a liquid crystal layer disposed in the gap; and

spacers disposed in the liquid crystal layer;

wherein the LCD device comprises a display region for displaying images and a non-display region which does not display images;

wherein the display region includes the pixels;

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wherein the non-display region is disposed between the display region and the sealing member;

wherein the spacers are arranged only in the display region and not in the non-display region; and

further comprising a depression ~~for receiving~~which receives excess liquid crystal from the liquid crystal layer so that the gap between the first substrate and the second substrate is substantially uniform in the display region.

23. (previously presented): The device according to claim 22, wherein when the non-display region has a width L (μm) and the gap in the display region has an average value d (μm), the depression has a height H satisfying a relationship of

$$H \geq (1/2) \times (1000 + L) \times [0.02d + [L \times (0.02d/1000)]]/L (\mu\text{m}).$$